CLAIMS

What is claimed is:

1. A method of scaling a drive assembly having half-bridge assemblies for controlling a brushless direct current (BLDC) motor with a predetermined number of phase windings, comprising the steps of:

sequentially activating a plurality of the half-bridge assemblies in a grouping to generate an output signal to a respective one of the phase windings at a frequency greater than the frequency capability of a single one of the half-bridge assemblies;

combining multiple half-bridge assembly groupings to generate a level of drive current into respective phase windings that is greater than the current capability of a single one of the half-bridge assembly groupings; and

equalizing the current share in each of the half-bridge assembly groupings by forcing current sharing in the respective phase windings.

2. The method of claim 1 wherein the equalized current sharing in the half-bridge assembly groupings is forced through the use of corresponding "In-Hand" phase windings.

3. A control system for driving a brushless direct current (BLDC) motor having a predetermined number of phase windings, comprising:

a drive assembly in electrical communication with the phase windings of the BLDC motor, the drive assembly comprising a plurality of half-bridge assembly groupings, each half-bridge assembly grouping being comprised of a plurality of half-bridge assemblies, each having switching elements capable of operating at a first frequency and at a first current level;

a processor in electrical communication with the drive assembly, the processor configured to control the operation of the switching elements in the half-bridge assemblies, wherein each grouping of the half-bridge assemblies is configured to generate pulse-width-modulated signals into a respective phase winding at a second frequency that is higher than the first frequency; and

a plurality of the half-bridge assembly groupings configured to generate a second current level in their corresponding phase windings that is greater than the first current level.

4. The control system of claim 3 wherein the second frequency is equal to the product of the first frequency and the number of half-bridge assemblies in a grouping electrically connected to a respective phase winding.

5. The control system of claim 4 wherein the second current level is equal to the product of the first current level and the number of groupings of half-bridge assemblies in electrical communication with a corresponding phase winding.

6. The control system of claim 5 wherein the phase windings are configured as multiple "IN_HAND" windings to force approximately equal current sharing between the corresponding switching elements of their respective half-bridge assemblies.

7. The control system of claim 6 wherein the "IN_HAND" windings comprise two or more approximately identical coils wrapped around the same core.

8. The control system of claim 6 wherein the switching elements comprise insulated gate bipolar transistors (IGBT's).

9. A drive assembly for providing a pulse-width-modulated input voltage to a brushless direct current (BLDC) motor, wherein the drive assembly comprises a plurality of half-bridge assemblies that each include two switching elements that are each capable of operating at no more than a predetermined frequency and a predetermined current level, wherein at least two half-bridge assemblies are electrically connected to each phase winding of the BLDC motor, such that the at least two half-bridge assemblies are capable of providing a pulse-width-modulated input voltage to the respective phase winding of the BLDC motor at a frequency higher than the predetermined frequency, and wherein multiple groups of half-bridge assemblies are in electrical communication with corresponding phase windings of the BLDC motor, such that the multiple groups of half-bridge assemblies are capable of providing a combined current level to respective phase windings of the BLDC motor that is greater than the predetermined current level.

10. The drive assembly of claim 9 wherein the switching elements comprise insulated gate bipolar transistors (IGBT's).

11. The drive assembly of claim 9 wherein the switching elements of the plurality of half-bridge assemblies are each capable of operating at an operating frequency that is less than the predetermined frequency, wherein the at least two half-bridge assemblies that are electrically connected to respective phase windings of the BLDC motor are capable of providing the pulse-width-modulated input voltage to the respective phase windings of the BLDC motor at a frequency equal to the product of the number of half-bridge assemblies electrically connected to the respective phase windings and the operating frequency.

12. The drive assembly of claim 9 wherein the phase windings of the BLDC motor are configured as multiple "IN_HAND" windings to force approximately equal current sharing between the corresponding switching elements of the respective multiple groupings of half-bridge assemblies.

13. The drive assembly of claim 12 wherein the "IN_HAND" windings comprise two or more approximately identical coils wrapped around the same core.

14. The drive assembly of claim 13 wherein the combined current level is equal to the product of the predetermined current level and the number of multiple groupings of half-bridge assemblies in electrical communication with a corresponding phase winding.